

SEQUENCE LISTING

<110> Apicella, Michael A.
Edwards, Jennifer L.

<120> Vaccine and compositions for the
prevention and treatment of Neisserial infections

<130> 875.079US1

<150> US 10/066,551

<151> 2002-01-31

<150> US 60/344,452

<151> 2001-10-23

<150> US 60/310,356

<151> 2001-08-06

<150> US 60/266,070

<151> 2001-01-31

<160> 31

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 2015

<212> PRT

<213> Neisseria gonorrhoeae

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Leu	Ser	Met	Val	Leu	Pro	Ala	His	Ala	Gln	Ile	Thr	Thr	Asp	Lys	Ser
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Ala	Pro	Lys	Asn	Gln	Val	Val	Ile	Leu	Lys	Thr	Asn	Thr	Gly	Ala	
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Arg	Tyr	Thr	Gln	Phe	Asp	Val	Asp	Asn	Lys	Gly	Ala	Val	Leu	Asn	Asn
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Asp	Arg	Asn	Asn	Asn	Pro	Phe	Leu	Val	Lys	Gly	Ser	Ala	Gln	Leu	Ile
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			165					170						175	
Thr	Val	Asn	Gly	Gly	Gly	Phe	Lys	Asn	Val	Gly	Arg	Gly	Ile	Leu	Thr
		180						185					190		
Ile	Gly	Ala	Pro	Gln	Ile	Gly	Lys	Asp	Gly	Ala	Leu	Thr	Gly	Phe	Asp
	195						200					205			
Val	Arg	Gln	Gly	Thr	Leu	Thr	Val	Gly	Ala	Ala	Gly	Trp	Asn	Asp	Lys
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Gly	Gly	Ala	Asp	Tyr	Thr	Gly	Val	Leu	Ala	Arg	Ala	Val	Ala	Leu	Gln
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Gly	Lys	Leu	Gln	Gly	Lys	Asn	Leu	Ala	Val	Ser	Thr	Gly	Pro	Gln	Lys
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Val	Asp	Tyr	Ala	Ser	Gly	Glu	Ile	Ser	Ala	Gly	Thr	Ala	Ala	Gly	Thr
			260						265				270		
Lys	Pro	Thr	Ile	Ala	Leu	Asp	Thr	Ala	Ala	Leu	Gly	Gly	Met	Tyr	Ala
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Asp	Ser	Ile	Thr	Leu	Ile	Ala	Asn	Glu	Lys	Gly	Val	Gly	Val	Lys	Asn
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Ala	Gly	Thr	Leu	Glu	Ala	Ala	Lys	Gln	Leu	Ile	Val	Thr	Ser	Ser	Gly
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Arg	Ile	Glu	Asn	Ser	Gly	Arg	Ile	Ala	Thr	Thr	Ala	Asp	Gly	Thr	Glu
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Ala	Ser	Pro	Thr	Tyr	Leu	Ser	Ile	Glu	Thr	Thr	Glu	Lys	Gly	Ala	Ala
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Val	Ile	Glu	Thr	Gly	Glu	Asp	Ile	Ser	Leu	Arg	Asn	Gly	Ala	Val	Val
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Gln	Asn	Asn	Gly	Ser	Arg	Pro	Ala	Thr	Thr	Val	Leu	Asn	Ala	Gly	His
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Asn	Leu	Val	Ile	Glu	Ser	Lys	Thr	Asn	Val	Asn	Asn	Ala	Lys	Gly	Ser
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Ala	Asn	Leu	Ser	Ala	Gly	Gly	Arg	Thr	Thr	Ile	Asn	Asp	Ala	Thr	Ile
			420						425				430		
Gln	Ala	Gly	Ser	Ser	Val	Tyr	Ser	Ser	Thr	Lys	Gly	Asp	Thr	Glu	Leu
			435				440					445			
Gly	Glu	Asn	Thr	Arg	Ile	Ile	Ala	Glu	Asn	Val	Thr	Val	Leu	Ser	Asn
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Gly	Ser	Ile	Gly	Ser	Ala	Ala	Val	Ile	Glu	Ala	Lys	Asp	Thr	Ala	His
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Ile	Glu	Ser	Gly	Lys	Pro	Leu	Ser	Leu	Glu	Thr	Ser	Thr	Val	Ala	Ser
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Leu	Leu	Ala	Asp	Asp	Asn	Ile	Thr	Ala	Lys	Thr	Thr	Asn	Leu	Asn	Thr
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Pro	Gly	Asn	Leu	Tyr	Val	His	Thr	Gly	Lys	Asp	Leu	Asn	Leu	Asn	Val
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Asp	Lys	Asp	Leu	Ser	Ala	Ala	Ser	Ile	His	Leu	Lys	Ser	Asp	Asn	Ala
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Ala	His	Ile	Thr	Gly	Thr	Ser	Lys	Thr	Leu	Thr	Ala	Ser	Lys	Asp	Met
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Gly	Val	Glu	Ala	Gly	Leu	Leu	Asn	Val	Thr	Asn	Thr	Asn	Leu	Arg	Thr
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Arg	Asn	Thr	Lys	Leu	Asn	Ala	Ala	Lys	Ala	Leu	Glu	Thr	Thr	Ala	Leu
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Gln	Gly	Asn	Ile	Val	Ser	Asp	Gly	Leu	His	Ala	Val	Ser	Ala	Asp	Gly
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His	Val	Ser	Leu	Leu	Ala	Asn	Gly	Asn	Ala	Asp	Phe	Thr	Gly	His	Asn
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Thr	Leu	Thr	Ala	Lys	Ala	Asp	Val	Asn	Ala	Gly	Ser	Val	Gly	Lys	Gly
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Arg	Leu	Lys	Ala	Asp	Asn	Thr	Asn	Ile	Thr	Ser	Ser	Ser	Gly	Asp	Ile
			675				680					685			
Thr	Leu	Val	Ala	Gly	Asn	Gly	Ile	Gln	Leu	Gly	Asp	Gly	Lys	Gln	Arg
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705					710					715					720
Ala	Asp	Leu	Lys	Asn	Leu	Asn	Val	His	Ala	Lys	Ser	Gly	Ala	Leu	Asn
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Ile	His	Ser	Asp	Arg	Ala	Leu	Ser	Ile	Glu	Asn	Thr	Lys	Leu	Glu	Ser	740	745	750
Thr	His	Asn	Thr	His	Leu	Asn	Ala	Gln	His	Glu	Arg	Val	Thr	Leu	Asn	755	760	765
Gln	Val	Asp	Ala	Tyr	Ala	His	Arg	His	Leu	Ser	Ile	Thr	Gly	Ser	Gln	770	775	780
Ile	Trp	Gln	Asn	Asp	Lys	Leu	Pro	Ser	Ala	Asn	Lys	Leu	Val	Ala	Asn	785	790	800
Gly	Val	Leu	Ala	Leu	Asn	Ala	Arg	Tyr	Ser	Gln	Ile	Ala	Asp	Asn	Thr	805	810	815
Thr	Leu	Arg	Ala	Gly	Ala	Ile	Asn	Leu	Thr	Ala	Gly	Thr	Ala	Leu	Val	820	825	830
Lys	Arg	Gly	Asn	Ile	Asn	Trp	Ser	Thr	Val	Ser	Thr	Lys	Thr	Leu	Glu	835	840	845
Asp	Asn	Ala	Glu	Leu	Lys	Pro	Leu	Ala	Gly	Arg	Leu	Asn	Ile	Glu	Ala	850	855	860
Gly	Ser	Gly	Thr	Leu	Thr	Ile	Glu	Pro	Ala	Asn	Arg	Ile	Ser	Ala	His	865	870	875
Thr	Asp	Leu	Ser	Ile	Lys	Thr	Gly	Gly	Lys	Leu	Leu	Leu	Ser	Ala	Lys	885	890	895
Gly	Gly	Asn	Ala	Gly	Ala	Pro	Ser	Ala	Gln	Val	Ser	Ser	Leu	Glu	Ala	900	905	910
Lys	Gly	Asn	Ile	Arg	Leu	Val	Thr	Gly	Glu	Thr	Asp	Leu	Arg	Gly	Ser	915	920	925
Lys	Ile	Thr	Ala	Gly	Lys	Asn	Leu	Val	Val	Ala	Thr	Thr	Lys	Gly	Lys	930	935	940
Leu	Asn	Ile	Glu	Ala	Val	Asn	Asn	Ser	Phe	Ser	Asn	Tyr	Phe	Pro	Thr	945	950	955
Gln	Lys	Ala	Ala	Glu	Leu	Asn	Gln	Lys	Ser	Lys	Glu	Leu	Glu	Gln	Gln	965	970	975
Ile	Ala	Gln	Leu	Lys	Lys	Ser	Ser	Pro	Lys	Ser	Lys	Leu	Ile	Pro	Thr	980	985	990
Leu	Gln	Glu	Glu	Arg	Asp	Arg	Leu	Ala	Phe	Tyr	Ile	Gln	Ala	Ile	Asn	995	1000	1005
Lys	Glu	Val	Lys	Gly	Lys	Lys	Pro	Lys	Gly	Lys	Glu	Tyr	Leu	Gln	Ala	1010	1015	1020
Lys	Leu	Ser	Ala	Gln	Asn	Ile	Asp	Leu	Ile	Ser	Ala	Gln	Gly	Ile	Glu	1025	1030	1035
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Ala	Gly	Val	Leu	Pro	Lys	Ala	Ala	Asp	Ser	Glu	Ala	Ala	Ala	Ile	Leu	1060	1065	1070
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Ser	His	Tyr	Asp	Lys	Ala	Ala	Leu	Asn	Lys	Pro	Ser	Arg	Leu	Thr	Gly	1090	1095	1100
Arg	Thr	Gly	Val	Ser	Ile	His	Ala	Ala	Ala	Ala	Leu	Asp	Asp	Ala	Arg	1105	1110	1115
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Ile	Lys	Ala	His	Ser	Asp	Ile	Val	Leu	Glu	Ala	Gly	Gln	Asn	Asp	Ala	1140	1145	1150
Tyr	Thr	Phe	Leu	Lys	Thr	Lys	Gly	Lys	Ser	Gly	Lys	Ile	Ile	Arg	Lys	1155	1160	1165
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Glu	Leu	Thr	Ala	Asn	Gly	Ile	Thr	Leu	Gln	Ala	Gly	Gly	Asn	Ile	Glu	1185	1190	1195
Ala	Asn	Thr	Thr	Arg	Phe	Asn	Ala	Pro	Ala	Gly	Lys	Val	Thr	Leu	Val	1205	1210	1215
Ala	Gly	Glu	Glu	Leu	Gln	Leu	Leu	Ala	Glu	Glu	Gly	Ile	His	Lys	His	1220	1225	1230

Glu Leu Asp Val Gln Lys Ser Arg Arg Phe Ile Gly Ile Lys Val Gly
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 Lys Ser Asn Tyr Ser Lys Asn Glu Leu Asn Glu Thr Lys Leu Pro Val
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 Arg Val Val Ala Gln Thr Ala Ala Thr Arg Ser Gly Trp Asp Thr Val
 1265 1270 1275 1280
 Leu Glu Gly Thr Glu Phe Lys Thr Thr Leu Ala Gly Ala Asp Ile Gln
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 Ala Gly Val Gly Glu Lys Ala Arg Val Asp Ala Lys Ile Ile Leu Lys
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 Gly Ile Val Asn Arg Ile Gln Ser Glu Glu Lys Leu Glu Thr Asn Ser
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 Thr Val Trp Gln Lys Gln Ala Gly Arg Gly Ser Thr Ile Glu Thr Leu
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 Lys Leu Pro Ser Phe Glu Ser Pro Thr Pro Pro Lys Leu Ser Ala Pro
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 Gly Gly Tyr Ile Val Asp Ile Pro Lys Gly Asn Leu Lys Thr Glu Ile
 1365 1370 1375
 Glu Lys Leu Ser Lys Gln Pro Glu Tyr Ala Tyr Leu Lys Gln Leu Gln
 1380 1385 1390
 Val Ala Lys Asn Ile Asn Trp Asn Gln Val Gln Leu Ala Tyr Asp Arg
 1395 1400 1405
 Trp Asp Tyr Lys Gln Glu Gly Leu Thr Glu Ala Gly Ala Ala Ile Ile
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 Ala Leu Ala Val Thr Val Val Thr Ser Gly Ala Gly Thr Gly Ala Val
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 Leu Gly Leu Asn Gly Ala Ala Ala Ala Ala Thr Asp Ala Ala Phe Ala
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 Ser Leu Ala Ser Gln Ala Ser Val Ser Phe Ile Asn Asn Lys Gly Asp
 1460 1465 1470
 Val Gly Lys Thr Leu Lys Glu Leu Gly Arg Ser Ser Thr Val Lys Asn
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 Leu Val Val Ala Ala Ala Thr Ala Gly Val Ala Asp Lys Ile Gly Ala
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 Ser Ala Leu Asn Asn Val Ser Asp Lys Gln Trp Ile Asn Asn Leu Thr
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 Asn Gly Gly Ser Leu Lys Asp Asn Leu Gly Asp Ala Ala Leu Gly Ala
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 Ile Val Ser Thr Val His Gly Glu Val Ala Ser Lys Ile Lys Phe Asn
 1555 1560 1565
 Leu Ser Glu Asp Tyr Ile Thr His Lys Ile Ala His Ala Ile Ala Gly
 1570 1575 1580
 Cys Ala Ala Ala Ala Asn Lys Gly Lys Cys Gln Asp Gly Ala Ile
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 Gly Ala Ala Val Gly Glu Ile Val Gly Glu Ala Leu Thr Asn Gly Lys
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 Asn Pro Ala Thr Leu Thr Ala Lys Glu Arg Glu Gln Ile Leu Ala Tyr
 1620 1625 1630
 Ser Lys Leu Val Ala Gly Thr Val Ser Gly Val Val Gly Gly Asp Val
 1635 1640 1645
 Asn Thr Ala Ala Asn Ala Ala Lys Val Ala Ile Glu Asn Asn Leu Leu
 1650 1655 1660
 Ser Gln Glu Glu Tyr Ala Leu Arg Glu Lys Leu Ile Lys Lys Ala Lys
 1665 1670 1675 1680
 Gly Lys Gly Leu Leu Ser Leu Asp Trp Gly Ser Leu Thr Glu Gln Glu
 1685 1690 1695
 Ala Arg Gln Phe Ile Tyr Leu Ile Glu Lys Asp Arg Tyr Ser Asn Gln
 1700 1705 1710
 Leu Leu Asp Arg Tyr Gln Lys Asn Pro Ser Ser Leu Asn Asn Gln Glu
 1715 1720 1725

Lys Asn Ile Leu Ala Tyr Phe Ile Asn Gln Thr Ser Gly Gly Asn Thr
 1730 1735 1740
 Ala Trp Ala Ala Ser Ile Leu Lys Thr Pro Gln Ser Met Gly Asn Leu
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 Thr Ile Pro Ser Lys Asp Ile Asn Asn Thr Leu Ser Lys Ala Tyr Gln
 1765 1770 1775
 Thr Leu Ser Arg Tyr Asp Ser Phe Asp Tyr Lys Ser Ala Val Ala Ala
 1780 1785 1790
 Gln Pro Ala Leu Tyr Leu Leu Asn Gly Pro Leu Gly Phe Ser Val Lys
 1795 1800 1805
 Ala Ala Thr Val Ala Ala Gly Gly Tyr Asn Ile Gly Gln Gly Ala Lys
 1810 1815 1820
 Ala Ile Ser Asn Gly Glu Tyr Leu His Gly Thr Val Gln Val Val Asn
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 Gly Thr Leu Met Val Ala Gly Ser Val Ser Ala Gln Ala Ala Ile Ser
 1845 1850 1855
 Ala Lys Pro Ala Pro Val Thr Arg Tyr Leu Ser Asn Asp Ser Ala Pro
 1860 1865 1870
 Ala Leu Arg Gln Ala Leu Thr Ala Glu Ser Gln Arg Ile Arg Met Lys
 1875 1880 1885
 Leu Pro Glu Glu Tyr Arg Gln Ile Gly Asn Leu Ala Ile Ala Lys Ile
 1890 1895 1900
 Asp Val Lys Gly Leu Pro Gln Arg Met Glu Ala Phe Ser Ser Phe Gln
 1905 1910 1915 1920
 Lys Gly Glu His Gly Phe Ile Ser Leu Pro Glu Thr Lys Ile Phe Lys
 1925 1930 1935
 Pro Ile Ser Val Asp Lys Tyr His Asn Ile Ala Ser Pro Pro Arg Gly
 1940 1945 1950
 Thr Leu Arg Asn Ile Asp Gly Glu Tyr Lys Leu Leu Glu Thr Ile Ala
 1955 1960 1965
 Gln Gln Leu Gly Asn Asn Arg Asn Val Ser Gly Arg Ile Asp Leu Phe
 1970 1975 1980
 Thr Glu Leu Lys Ala Cys Gln Ser Cys Ser Asn Val Ile Leu Glu Phe
 1985 1990 1995 2000
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 2005 2010 2015

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 <213> Neisseria gonorrhoeae

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 35 40 45
 Arg Pro Arg Ala Thr Ser Gly Leu Leu His Thr Ser Thr Ala Ser Asp
 50 55 60
 Lys Ile Ile Ser Gly Asp Thr Leu Arg Gln Lys Ala Val Asn Leu Gly
 65 70 75 80
 Asp Ala Leu Asp Gly Val Pro Gly Ile His Ala Ser Gln Tyr Gly Gly
 85 90 95
 Gly Ala Ser Ala Pro Val Ile Arg Gly Gln Thr Gly Arg Arg Ile Lys
 100 105 110
 Val Leu Asn His His Gly Glu Thr Gly Asp Met Ala Asp Phe Ser Pro
 115 120 125
 Asp His Ala Ile Met Val Asp Ser Ala Leu Ser Gln Gln Val Glu Ile
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Gly	Val	Ser	Gly	Glu	Leu	Gly	Leu	Arg	Leu	Ser	Ser	Gly	Asn	Leu	Glu	180	185	190	
Lys	Leu	Thr	Ser	Gly	Gly	Ile	Asn	Ile	Gly	Leu	Gly	Lys	Asn	Phe	Val	195	200	205	
Leu	His	Thr	Glu	Gly	Leu	Tyr	Arg	Lys	Ser	Gly	Asp	Tyr	Ala	Val	Pro	210	215	220	
Arg	Tyr	Arg	Asn	Leu	Lys	Arg	Leu	Pro	Asp	Ser	His	Ala	Asp	Ser	Gln	225	230	235	240
Thr	Gly	Ser	Ile	Gly	Leu	Ser	Trp	Val	Gly	Glu	Lys	Gly	Phe	Ile	Gly	245	250	255	
Ala	Ala	Tyr	Ser	Asp	Arg	Arg	Asp	Gln	Tyr	Gly	Leu	Pro	Ala	His	Ser	260	265	270	
His	Glu	Tyr	Asp	Asp	Cys	His	Ala	Asp	Ile	Ile	Trp	Gln	Lys	Ser	Leu	275	280	285	
Ile	Asn	Lys	Arg	Tyr	Leu	Gln	Leu	Tyr	Pro	His	Leu	Leu	Thr	Glu	Glu	290	295	300	
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Asp	Asp	Ala	His	Ala	His	Ala	His	Asn	Gly	Lys	Pro	Trp	Ile	Asp	Leu	325	330	335	
Arg	Asn	Lys	Arg	Tyr	Glu	Leu	Arg	Ala	Glu	Trp	Lys	Gln	Pro	Phe	Pro	340	345	350	
Gly	Phe	Glu	Ala	Leu	Arg	Val	His	Leu	Asn	Arg	Asn	Asp	Tyr	Arg	His	355	360	365	
Asp	Glu	Lys	Ala	Gly	Asp	Ala	Val	Glu	Asn	Phe	Phe	Asn	Asn	Gln	Thr	370	375	380	
Gln	Asn	Ala	Arg	Ile	Glu	Leu	Arg	His	Gln	Pro	Ile	Gly	Arg	Leu	Lys	385	390	395	400
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Ala	Thr	Ser	Glu	Ala	Val	Lys	Gln	Pro	Met	Leu	Leu	Asp	Asn	Lys	Val	420	425	430	
Gln	His	Tyr	Ser	Phe	Phe	Gly	Val	Glu	Gln	Ala	Asn	Trp	Asp	Asn	Phe	435	440	445	
Thr	Leu	Glu	Gly	Gly	Val	Arg	Val	Glu	Lys	Gln	Lys	Ala	Ser	Ile	Arg	450	455	460	
Tyr	Asp	Lys	Ala	Leu	Ile	Asp	Arg	Glu	Asn	Tyr	Tyr	Asn	His	Pro	Leu	465	470	475	480
Pro	Asp	Leu	Gly	Ala	His	Arg	Gln	Thr	Ala	Arg	Ser	Phe	Ala	Leu	Ser	485	490	495	
Gly	Asn	Trp	Tyr	Phe	Thr	Pro	Gln	His	Lys	Leu	Ser	Leu	Thr	Ala	Ser	500	505	510	
His	Gln	Glu	Arg	Leu	Pro	Ser	Thr	Gln	Glu	Leu	Tyr	Ala	His	Gly	Lys	515	520	525	
His	Val	Ala	Thr	Asn	Thr	Phe	Glu	Val	Gly	Asn	Lys	His	Leu	Asn	Lys	530	535	540	
Glu	Arg	Ser	Asn	Asn	Ile	Glu	Leu	Ala	Leu	Gly	Tyr	Glu	Gly	Asp	Arg	545	550	555	560
Trp	Gln	Tyr	Asn	Leu	Ala	Leu	Tyr	Arg	Asn	Arg	Phe	Gly	Asn	Tyr	Ile	565	570	575	
Tyr	Ala	Gln	Thr	Leu	Asn	Asp	Gly	Arg	Gly	Pro	Lys	Ser	Ile	Glu	Asp	580	585	590	
Asp	Ser	Glu	Met	Lys	Leu	Val	Arg	Tyr	Asn	Gln	Ser	Gly	Ala	Asp	Phe	595	600	605	
Tyr	Gly	Ala	Glu	Gly	Glu	Ile	Tyr	Phe	Lys	Pro	Thr	Pro	Arg	Tyr	Arg	610	615	620	
Ile	Gly	Val	Ser	Gly	Asp	Tyr	Val	Arg	Gly	Arg	Leu	Lys	Asn	Leu	Pro	625	630	635	640

Ser	Leu	Pro	Gly	Arg	Glu	Asp	Ala	Tyr	Gly	Asn	Arg	Pro	Leu	Ile	Ala	
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Gln	Ala	Asp	Gln	Asn	Ala	Pro	Arg	Val	Pro	Ala	Ala	Arg	Leu	Gly	Val	
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His	Leu	Lys	Ala	Ser	Leu	Thr	Asp	Arg	Ile	Asp	Ala	Asn	Leu	Asp	Tyr	
		675					680					685				
Tyr	Arg	Val	Phe	Ala	Gln	Asn	Lys	Leu	Ala	Arg	Tyr	Glu	Thr	Arg	Thr	
	690					695					700					
Pro	Gly	His	His	Met	Leu	Asn	Leu	Gly	Ala	Asn	Tyr	Arg	Arg	Asn	Thr	
705					710					715					720	
Arg	Tyr	Gly	Glu	Trp	Asn	Trp	Tyr	Val	Lys	Ala	Asp	Asn	Leu	Leu	Asn	
				725					730					735		
Gln	Ser	Val	Tyr	Ala	His	Ser	Ser	Phe	Leu	Ser	Asp	Thr	Pro	Gln	Met	
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Gly	Arg	Ser	Phe	Thr	Gly	Gly	Val	Asn	Val	Lys	Phe					
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<211> 720

<212> PRT

<213> Neisseria gonorrhoeae

<400> 3

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			20					25					30			
Thr	Val	Thr	Val	Lys	Gly	Asp	Arg	Gln	Gly	Ser	Lys	Ile	Arg	Thr	Asn	
		35					40					45				
Ile	Val	Thr	Leu	Gln	Gln	Lys	Asp	Glu	Ser	Thr	Ala	Thr	Asp	Met	Arg	
	50					55					60					
Glu	Leu	Leu	Lys	Glu	Glu	Pro	Ser	Ile	Asp	Phe	Gly	Gly	Gly	Asn	Gly	
65				70						75					80	
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Thr Ala Ser Leu Asn Lys His Thr Cys Arg Ser Tyr Arg Gly Ser Phe
50 55 60
Leu Ser Leu Glu Lys Ile Gly Leu Leu Ser Leu Asp Met Asn Leu Gln
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Glu Phe Ser Leu Leu Asn His Asn Leu Ile Leu Asp Ala Ile Lys Lys
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Val Ser Ser Ala Lys Thr Ser Trp Thr Glu Gly Thr Lys Gln Val Arg
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Ser Phe Ser Gln Leu Lys Asn Arg Gln Thr Glu Lys Arg Ile Ile Ile
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Thr Tyr Pro Gln Lys Phe Met His Phe Leu Gln Glu Tyr Ile Gly Gln
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Arg Arg Gly Phe Val Phe Val Thr Arg Ser Gly Lys Met Val Gly Leu
245 250 255
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Tyr Lys Arg Leu Gly Cys Ser Asp Ser Asp Ile Met Lys Val Thr Gly
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<211> 2295

<212> DNA

<213> *Neisseria gonorrhoeae*

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<211> 2307

<212> DNA

<213> Neisseria gonorrhoeae

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<212> DNA

<213> Neisseria gonorrhoeae

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<211> 993

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<213> Neisseria gonorrhoeae

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Val Met Glu Gln Phe Lys Lys Ser Lys Thr Leu Phe Ser Leu Met Gln
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Tyr Ser Asp Glu Phe Arg Ile His Phe Thr Phe Asn Asp Phe Lys Arg
50 55 60
Asn Pro Ser Pro Arg Ser His Val Ser Pro Ile Lys Gln Leu Asn Gly
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Arg Thr Lys Thr Ala Ser Gly Ile Arg Lys Val Val Arg Glu Leu Phe
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His Lys Thr Asn Gly Ala Arg Glu Asn Ala Ala Lys Ile Leu Val Val
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Ile Thr Asp Gly Glu Lys Phe Gly Asp Pro Leu Asp Tyr Lys Asp Val
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Gly Asn Ala Phe Asn Lys Pro Gln Ser Arg Arg Glu Leu Asp Thr Ile
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Ala Ser Lys Pro Ala Gly Glu His Val Phe Gln Val Asp Asn Phe Glu
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<212> DNA
<213> Neisseria gonorrhoeae 1291

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<213> Neisseria gonorrhoeae 1291

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Gly	Lys	Gly	Leu	Gln	Ala	Leu	Gly	Tyr	Asn	Asp	Glu	Thr	Ser	Arg	His
			260					265					270		
Ala	Leu	Leu	Arg	Tyr	Arg	Glu	Thr	Val	Glu	Gln	Ser	Pro	Leu	Tyr	Gln
			275					280					285		
Lys	Ile	Gln	Thr	Gly	Arg	Ile	Asp	Trp	Gln	Ser	Val	Gln	Thr	Arg	Leu
			290					295					300		
Ile	Ser	Asp	Thr	Pro	Ala	Lys	Gly	Leu	Asp	Arg	Asp	Arg	Arg	Lys	Pro
						310					315				320
Pro	Ile	Ala	Gly	Arg	Leu	Gln	Asp	Ala	Leu	Lys	Gln	Pro	Glu	Lys	Ser
						325					330				335
Val	Tyr	Leu	Val	Ser	Pro	Tyr	Phe	Val	Pro	Thr	Lys	Ser	Gly	Thr	Asp
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Ala	Leu	Ala	Lys	Leu	Val	Gln	Asp	Gly	Ile	Asp	Val	Thr	Val	Leu	Thr
						355									365
Asn	Ser	Leu	Gln	Ala	Thr	Asp	Val	Ala	Ala	Val	His	Ser	Gly	Tyr	Val
						370									380
Lys	Tyr	Arg	Lys	Pro	Leu	Leu	Lys	Ala	Gly	Ile	Lys	Leu	Tyr	Glu	Leu
						390					395				400
Gln	Pro	Asn	His	Ala	Val	Pro	Ala	Thr	Lys	Asp	Lys	Gly	Leu	Thr	Gly
						405					410				415
Ser	Ser	Val	Thr	Ser	Leu	His	Ala	Lys	Thr	Phe	Ile	Val	Asp	Gly	Lys
						420					425				430
Arg	Ile	Phe	Ile	Gly	Ser	Phe	Asn	Leu	Asp	Pro	Arg	Ser	Ala	Arg	Leu
						435									445
Asn	Thr	Glu	Met	Gly	Val	Val	Ile	Glu	Ser	Pro	Lys	Ile	Ala	Glu	Gln
						450									460
Met	Glu	Arg	Thr	Leu	Ala	Asp	Thr	Thr	Pro	Glu	Tyr	Ala	Tyr	Arg	Val
						465					475				480
Thr	Leu	Asp	Lys	His	Asn	Arg	Leu	Gln	Trp	His	Asp	Pro	Ala	Thr	Arg
						485					490				495
Lys	Thr	Tyr	Pro	Asn	Glu	Pro	Glu	Ala	Lys	Leu	Trp	Lys	Arg	Ile	Ala
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<211> 1563

<212> DNA

<213> Neisseria gonorrhoeae 1090

<400> 15

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ctttgccgcc	cgcgccgcc	ttatcgaatc	tgccgaacac	agcctcgatt	tgcaatacta	300
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cctgtctgcc	ctcgacagcc	atcccaatat	cgaagtgcgc	ccgttcaacc	ccttcgtcct	480
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cagcgtcgtc	ggcgaagtat	cgcacgactt	cgaccgctac	tgggcaagcc	attccgcca	720
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aggctgcaag	acgcgctcaa	acagcccga	aaaagcgtct	atctggtttc	accctatttc	1020
gtccctacaa	aatccggcac	agacgcactg	gcaaaactgg	tgcaaggacg	catagacgtt	1080
accgtcctga	ccaactcgct	acaggcgacc	gacgttgccg	ccgtccattc	cggctacgtc	1140
aaataccgaa	aaccgtgct	caaagccggc	atcaaaactct	acgagctgca	acccaaccat	1200
gccgtccccg	ccacaaaaga	caaaggcctg	accggcagct	ccgtaaccag	cctgcatgcc	1260

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 <211> 525
 <212> PRT
 <213> Neisseria gonorrhoeae 1090

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		20						25					30		
Ser	Cys	Ser	Ser	Trp	Leu	Pro	Pro	Leu	Glu	Glu	Arg	Thr	Glu	Ser	Arg
		35					40					45			
His	Phe	Asn	Thr	Ser	Lys	Pro	Val	Leu	Leu	Asp	Asn	Ile	Leu	Gln	Ile
	50					55					60				
Arg	His	Thr	Pro	His	Asn	Asn	Gly	Leu	Ser	Asp	Ile	Tyr	Leu	Leu	Asp
65					70					75					80
Asp	Pro	His	Glu	Ala	Phe	Ala	Ala	Arg	Ala	Ala	Leu	Ile	Glu	Ser	Ala
				85					90					95	
Glu	His	Ser	Leu	Asp	Leu	Gln	Tyr	Tyr	Ile	Trp	Arg	Asn	Asp	Ile	Ser
			100					105					110		
Gly	Arg	Leu	Leu	Phe	Asn	Leu	Met	Tyr	Leu	Ala	Ala	Glu	Arg	Gly	Val
	115						120					125			
Arg	Val	Arg	Leu	Leu	Leu	Asp	Asn	Asn	Thr	Arg	Gly	Leu	Asp	Asp	
	130					135					140				
Leu	Leu	Leu	Ala	Leu	Asp	Ser	His	Pro	Asn	Ile	Glu	Val	Arg	Leu	Phe
145					150					155					160
Asn	Pro	Phe	Val	Leu	Arg	Lys	Trp	Arg	Ala	Leu	Gly	Tyr	Leu	Thr	Asp
				165					170					175	
Phe	Pro	Arg	Leu	Asn	Arg	Arg	Met	His	Asn	Lys	Ser	Phe	Thr	Ala	Asp
			180					185					190		
Asn	Arg	Ala	Thr	Ile	Leu	Gly	Gly	Arg	Asn	Ile	Gly	Asp	Glu	Tyr	Phe
	195						200					205			
Lys	Val	Gly	Glu	Asp	Thr	Val	Phe	Ala	Asp	Leu	Asp	Ile	Leu	Ala	Thr
	210					215					220				
Gly	Ser	Val	Val	Gly	Glu	Val	Ser	His	Asp	Phe	Asp	Arg	Tyr	Trp	Ala
225					230					235					240
Ser	His	Ser	Ala	His	Asn	Ala	Thr	Arg	Ile	Ile	Arg	Ser	Gly	Asn	Ile
				245					250					255	
Gly	Lys	Gly	Leu	Gln	Ala	Leu	Gly	Tyr	Asn	Asp	Glu	Thr	Ser	Arg	His
			260					265					270		
Ala	Leu	Leu	Arg	Tyr	Arg	Glu	Thr	Val	Glu	Gln	Ser	Pro	Leu	Tyr	Gln
			275				280					285			
Lys	Ile	Gln	Thr	Gly	Arg	Ile	Asp	Trp	Gln	Ser	Val	Gln	Thr	Arg	Leu
	290					295					300				
Ile	Ser	Asp	Ser	Pro	Ala	Lys	Gly	Leu	Asp	Arg	Asp	Arg	Arg	Lys	Pro
305					310					315					320
Pro	Ile	Ala	Gly	Arg	Leu	Gln	Asp	Ala	Leu	Lys	Gln	Pro	Glu	Lys	Ser
				325					330					335	
Val	Tyr	Leu	Val	Ser	Pro	Tyr	Phe	Val	Pro	Thr	Lys	Ser	Gly	Thr	Asp
			340					345					350		
Ala	Leu	Ala	Lys	Leu	Val	Gln	Asp	Gly	Ile	Asp	Val	Thr	Val	Leu	Thr
			355				360					365			
Asn	Ser	Leu	Gln	Ala	Thr	Asp	Val	Ala	Ala	Val	His	Ser	Gly	Tyr	Val
	370					375					380				

Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
 385 390 395 400
 Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
 405 410 415
 Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
 420 425 430
 Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
 435 440 445
 Asn Thr Glu Met Gly Val Val Ile Glu Ser Pro Lys Ile Ala Glu Gln
 450 455 460
 Met Glu Arg Thr Leu Ala Asp Thr Thr Pro Glu Tyr Ala Tyr Arg Val
 465 470 475 480
 Thr Leu Asp Lys His Asn Arg Leu Gln Trp His Asp Pro Ala Thr Arg
 485 490 495
 Lys Thr Tyr Pro Asn Glu Pro Glu Ala Lys Leu Trp Lys Arg Ile Ala
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 <212> DNA
 <213> Neisseria gonorrhoeae ms11

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 ggaaagccgt catttcaata cttccaaacc tgtcctcctg gacaacatcc tgcaaaccg 180
 gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc 240
 ctttgccgcc cgcgcgcgcc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta 300
 catttgccgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga 360
 acgcggcggt cgcgtacgcc tgcgtgttga cgacaacaac acgcgcgggt tggacgatct 420
 cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtcct 480
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 caacaaatcc ttaccgccg acaaccgcgc caccatactc ggccggacgca ataccggcga 600
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 cagcgctcgtc cggcgaagta tcgcacgact tcgaccgcta ctgggcaagc cattccgccc 720
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 <211> 525
 <212> PRT
 <213> Neisseria gonorrhoeae ms11

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Ser	Cys	Ser	Ser	Trp	Leu	Pro	Pro	Leu	Glu	Glu	Arg	Thr	Glu	Ser	Arg	
		35				40						45				
His	Phe	Asn	Thr	Ser	Lys	Pro	Val	Leu	Leu	Asp	Asn	Ile	Leu	Gln	Ile	
	50				55					60						
Arg	His	Thr	Pro	His	Asn	Asn	Gly	Leu	Ser	Asp	Ile	Tyr	Leu	Leu	Asp	
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Asp	Pro	His	Glu	Ala	Phe	Ala	Ala	Arg	Ala	Ala	Leu	Ile	Glu	Ser	Ala	
			85					90						95		
Glu	His	Ser	Leu	Asp	Leu	Gln	Tyr	Tyr	Ile	Trp	Arg	Asn	Asp	Ile	Ser	
			100					105					110			
Gly	Arg	Leu	Leu	Phe	Asn	Leu	Met	Tyr	Leu	Ala	Ala	Glu	Arg	Gly	Val	
	115						120					125				
Arg	Val	Arg	Leu	Leu	Leu	Asp	Asp	Asn	Asn	Thr	Arg	Gly	Leu	Asp	Asp	
	130					135					140					
Leu	Leu	Leu	Ala	Leu	Asp	Ser	His	Pro	Asn	Ile	Glu	Val	Arg	Leu	Phe	
145					150					155					160	
Asn	Pro	Phe	Val	Leu	Arg	Lys	Trp	Arg	Ala	Leu	Gly	Tyr	Leu	Thr	Asp	
			165						170					175		
Phe	Pro	Arg	Leu	Asn	Arg	Arg	Met	His	Asn	Lys	Ser	Phe	Thr	Ala	Asp	
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Asn	Arg	Ala	Thr	Ile	Leu	Gly	Gly	Arg	Asn	Ile	Gly	Asp	Glu	Tyr	Phe	
	195					200						205				
Lys	Val	Gly	Glu	Asp	Thr	Val	Phe	Ala	Asp	Leu	Asp	Ile	Leu	Ala	Thr	
	210					215					220					
Gly	Ser	Val	Val	Gly	Glu	Val	Ser	His	Asp	Phe	Asp	Arg	Tyr	Trp	Ala	
225					230					235					240	
Ser	His	Ser	Ala	His	Asn	Ala	Thr	Arg	Ile	Ile	Arg	Ser	Gly	Asn	Ile	
			245						250					255		
Gly	Lys	Gly	Leu	Gln	Ala	Leu	Gly	Tyr	Asn	Asp	Glu	Thr	Ser	Arg	His	
			260					265					270			
Ala	Leu	Leu	Arg	Tyr	Arg	Glu	Thr	Val	Glu	Gln	Ser	Pro	Phe	Tyr	Gln	
	275						280					285				
Lys	Ile	Gln	Thr	Gly	Arg	Ile	Asp	Trp	Gln	Ser	Val	Gln	Thr	Arg	Leu	
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305					310					315					320	
Pro	Ile	Ala	Gly	Arg	Leu	Gln	Asp	Ala	Leu	Lys	Gln	Pro	Glu	Lys	Ser	
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Val	Tyr	Leu	Val	Ser	Pro	Tyr	Phe	Val	Pro	Thr	Lys	Ser	Gly	Thr	Asp	
			340					345					350			
Ala	Leu	Ala	Lys	Leu	Val	Gln	Asp	Gly	Ile	Asp	Val	Thr	Val	Leu	Thr	
	355						360					365				
Asn	Ser	Leu	Gln	Ala	Thr	Asp	Val	Ala	Ala	Val	His	Ser	Gly	Tyr	Val	
	370					375					380					
Lys	Tyr	Arg	Lys	Pro	Leu	Lys	Ala	Gly	Ile	Lys	Leu	Tyr	Glu	Leu		
385					390					395					400	
Gln	Pro	Asn	His	Ala	Val	Pro	Ala	Thr	Lys	Asp	Lys	Gly	Leu	Thr	Gly	
			405						410					415		
Ser	Ser	Val	Thr	Ser	Leu	His	Ala	Lys	Thr	Phe	Ile	Val	Asp	Gly	Lys	
			420					425					430			
Arg	Ile	Phe	Ile	Gly	Ser	Phe	Asn	Leu	Asp	Pro	Arg	Ser	Ala	Arg	Leu	
	435						440					445				
Asn	Thr	Glu	Met	Gly	Val	Val	Ile	Glu	Ser	Pro	Lys	Ile	Ala	Glu	Gln	
	450					455					460					
Met	Glu	Arg	Thr	Leu	Ala	Asp	Thr	Thr	Pro	Glu	Tyr	Ala	Tyr	Arg	Val	
465					470					475					480	
Thr	Leu	Asp	Lys	His	Asn	Arg	Leu	Gln	Trp	His	Asp	Pro	Ala	Thr	Arg	
			485						490					495		
Lys	Thr	Tyr	Pro	Asn	Glu	Pro	Glu	Ala	Lys	Leu	Trp	Lys	Arg	Ile	Ala	
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<210> 19
<211> 1564
<212> DNA
<213> Neisseria meningitidis B

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cctgctcgcc ctgcacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtctt 480
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<211> 525
<212> PRT
<213> Neisseria meningitidis B

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35 40 45
His Phe Asn Thr Ser Lys Pro Val Arg Leu Asp Asn Ile Leu Gln Ile
50 55 60
Arg His Thr Pro His Thr Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asn
65 70 75 80
Asp Pro His Glu Ala Phe Ala Ala Arg Ala Ala Leu Ile Glu Ser Ala
85 90 95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
100 105 110

Gly	Arg	Leu	Leu	Phe	Asn	Leu	Val	Tyr	Leu	Ala	Ala	Glu	Arg	Gly	Val
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Arg	Val	Arg	Leu	Leu	Leu	Asp	Asp	Asn	Asn	Thr	Arg	Gly	Leu	Asp	Asp
	130					135					140				
Leu	Leu	Leu	Ala	Leu	Asp	Ser	His	Pro	Asn	Ile	Glu	Val	Arg	Leu	Phe
145					150					155					160
Asn	Pro	Phe	Val	Leu	Arg	Lys	Trp	Arg	Ala	Leu	Gly	Tyr	Leu	Thr	Asp
				165					170					175	
Phe	Pro	Arg	Leu	Asn	Arg	Arg	Met	His	Asn	Lys	Ser	Phe	Thr	Ala	Asp
			180					185					190		
Asn	Arg	Ala	Thr	Ile	Leu	Gly	Gly	Arg	Asn	Ile	Gly	Asp	Glu	Tyr	Phe
		195					200					205			
Lys	Val	Gly	Glu	Asp	Thr	Val	Phe	Ala	Asp	Leu	Asp	Ile	Leu	Ala	Thr
	210					215					220				
Gly	Ser	Val	Val	Gly	Glu	Val	Ser	His	Asp	Phe	Asp	Arg	Tyr	Trp	Ala
225					230					235					240
Ser	His	Ser	Ala	His	Asn	Ala	Thr	Arg	Ile	Ile	Arg	Ser	Gly	Asn	Ile
				245					250					255	
Gly	Lys	Gly	Leu	Gln	Ala	Leu	Gly	Tyr	Asn	Asp	Glu	Thr	Ser	Arg	His
			260					265					270		
Ala	Leu	Leu	Arg	Tyr	Arg	Glu	Thr	Val	Glu	Gln	Ser	Pro	Leu	Tyr	Gln
		275					280					285			
Lys	Ile	Gln	Thr	Gly	Arg	Ile	Asp	Trp	Gln	Ser	Val	Gln	Thr	Arg	Leu
	290					295					300				
Ile	Ser	Asp	Asp	Pro	Ala	Lys	Gly	Leu	Asp	Arg	Asp	Arg	Arg	Lys	Pro
305					310					315					320
Pro	Ile	Ala	Gly	Arg	Leu	Gln	Asp	Ala	Leu	Lys	Gln	Pro	Glu	Lys	Ser
				325					330					335	
Val	Tyr	Leu	Val	Ser	Pro	Tyr	Phe	Val	Pro	Thr	Lys	Ser	Gly	Thr	Asp
			340					345					350		
Ala	Leu	Ala	Lys	Leu	Val	Gln	Asp	Gly	Ile	Asp	Val	Thr	Val	Leu	Thr
		355					360					365			
Asn	Ser	Leu	Gln	Ala	Thr	Asp	Val	Ala	Ala	Val	His	Ser	Gly	Tyr	Val
		370				375					380				
Lys	Tyr	Arg	Lys	Pro	Leu	Leu	Lys	Ala	Gly	Ile	Lys	Leu	Tyr	Glu	Leu
385					390					395					400
Gln	Pro	Asn	His	Ala	Val	Pro	Ala	Thr	Lys	Asp	Lys	Gly	Leu	Thr	Gly
				405					410					415	
Ser	Ser	Val	Thr	Ser	Leu	His	Ala	Lys	Thr	Phe	Ile	Val	Asp	Gly	Lys
			420					425					430		
Arg	Ile	Phe	Ile	Gly	Ser	Phe	Asn	Leu	Asp	Pro	Arg	Ser	Ala	Arg	Leu
		435					440					445			
Asn	Thr	Glu	Met	Gly	Val	Val	Ile	Glu	Ser	Pro	Lys	Ile	Ala	Glu	Gln
		450				455					460				
Met	Glu	Arg	Thr	Leu	Ala	Asp	Thr	Ser	Pro	Glu	Tyr	Ala	Tyr	Arg	Val
465					470					475					480
Thr	Leu	Asp	Arg	His	Asn	Arg	Leu	Gln	Trp	His	Asp	Pro	Ala	Thr	Arg
				485					490					495	
Lys	Thr	Tyr	Pro	Asn	Glu	Pro	Glu	Ala	Lys	Leu	Trp	Lys	Arg	Ile	Ala
			500					505					510		
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<210> 21

<211> 15

<212> PRT

<213> Neisseria gonorrhoeae

<400> 21

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<210> 22
 <211> 32
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> A primer used in a PCR.

 <400> 22
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 <210> 23
 <211> 42
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> A primer used in a PCR.

 <400> 23
 ggtggttgct cttccgcata ataaaccttc ttcgatgggc ag 42

 <210> 24
 <211> 1561
 <212> DNA
 <213> Neisseria gonorrhoeae

 <400> 24
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 gtgctgtcg agggtaacgc ggtaggcgta ttcgggtgag gtatcgcaa ggggtgcgtc 180
 catctgttct gcgatttttg ggttttcgat aacaacgccc atttcagtat tgagccgtgc 240
 ggaacggggg tcgaggttga atgagccgat gaagatgcgt ttgccgtcca caatgaagg 300
 tttggcatgc aggtctggtta cggagctgcc ggtcaggcct ttgtcttttg tggcagggac 360
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 gacgaaatag ggtgaaacca gatagacgct tttttcgggc tgtttgagcg cgtcttgag 600
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 ttctgcggca aggtacacga ggttgaacag cagtcggccg gaaatgtcgt tgcgccagat 1260
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 ccgattttgc aggatgttgt ccaggcggac gggtttgaa gtattgaaat gacggctttc 1440
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 <210> 25
 <211> 1563
 <212> DNA
 <213> Neisseria gonorrhoeae

 <400> 25

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acgcggcggtg	cgcgtacgcc	tgctgttggg	cgacaacaac	acgcgcggct	tggacgatct	420
cctgctcgcc	ctcgacagcc	atcccaatat	cgaagtgcgc	cgttcaacc	ccttcgtcct	480
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cacaaccgcc	tgcaatggca	cgatcccgcc	acccgaaaaa	cctaccgcaa	cgaaccgcaa	1500
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<210> 26

<211> 1561

<212> DNA

<213> *Neisseria gonorrhoeae*

<400> 26

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ggaaagccgt	cattttaata	cttccaaacc	tgctctcctg	gacaacatcc	tgcaaatccg	180
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ctttgccgcc	cgcgcgcgcc	ttatcgaatc	tgccgaacac	agcctcgatt	tgcaatacta	300
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acgcggcggtg	cgcgtacgcc	tgctgttggg	cgacaacaac	acgcgcggct	tggacgatct	420
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caaccgcctg	caatggcacg	atcccgccac	ccgaaaaaac	taccggaacg	aaccggaagc	1500
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a						1561

<210> 27
 <211> 1561
 <212> DNA
 <213> *Neisseria gonorrhoeae*

<400> 27
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 ggaaagccgt catttcaata cttccaaacc tgctctcctg gacaacatcc tgcaaatccg 180
 gcacaccctt cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc 240
 ccttgccgct cgcgcgcgcc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta 300
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<210> 28
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> A primer used in a PCR.

<400> 28
 tccatgcaag aatctggttt c 21

<210> 29
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> A primer used in a PCR.

<400> 29
 cgacaatgag cacagactca ca 22

<210> 30
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>

<223> A primer used in a PCR.

<400> 30

ccttcaggat tctgtccaca a

21

<210> 31

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> A primer used in a PCR.

<400> 31

cctctctcac aaccaattct tc

22